

TPACK Learning Activity One

For the first activity of the unit, students will use an iPod Touch app, Equivalents by MathTappers, focused on finding decimals, fractions, and percents that are equivalent. Students will play a matching game where they need to find the decimal, percent, and fraction that are all equal. After practicing with the app, there will be classroom discussion about patterns and connections they noticed while playing. Students will use this discussion with peers to discover an algorithm for converting between decimals, fractions, and percents. Students will use the SMART Notebook software on the laptops to create a group algorithm to share on the Smartboard.

During the app part of the activity, the teacher will monitor student work and ask questions that will help students who are struggling, such as “What will a picture of the fraction look like? How is this similar to a picture of a decimal? What does percent mean? What would this percent mean? Could that be made into a fraction? Say the decimal the proper way without using the word point. Does that sound like a fraction?” While students are working on creating an algorithm, the teacher will also prompt students by asking “Will your algorithm work for all decimals/fractions/percents? Can you think of a decimal/fraction/percent this algorithm won’t work for?” Lastly, the teacher will facilitate the class discussion and look for misconceptions while sharing algorithms. The teacher will ask the students to look for similarities and differences between the different strategies.

While in the classroom, students will begin the activity by working independently on the app while making notes of patterns and connections seen while playing. Then, students will work in pairs or groups of three to come up with an algorithm for converting between fractions, decimals, and percents. After creating

the SMART Notebook file, students will share the algorithms with the entire class. The class will be asked to compare and contrast the different methods presented.

In order to prepare students for this activity, a couple of specific skills need to be taught and practiced. First, students should be exposed to the app at least once before asked to look for patterns and connections, preferably on a day or two before the lesson. Also before students start to use the SMART Notebook software, the basic functions of the software need to be shared with students. They should understand how to type and draw in the software while using a laptop and not the Smartboard. It may also be helpful to show students how to use the shapes feature to draw circles and rectangles.

Learning objective

The learners in this lesson will be all 6th grade students in my classroom who are all at different points in their mathematics learning. The learning objective for this lesson is students should be able to convert between decimals, fractions, and percents and understand how the three are related. At the end of this activity students should be able to do two things. First, students should be able to change most rational numbers from a decimal to a percent or to a fraction and vice versa. Repeating decimals do not need to be understood by the end of this lesson. For example, students should be able to say that 15% is 0.15 and $\frac{3}{20}$. All students should be able to convert any decimal to a fraction and a percent. All should be able to convert all whole number percents to a fraction or decimal. Some students will be able to convert any fraction to a decimal and percent. Only some students will be able to do this because repeating decimals and percents with decimals (such as 12.5% being equivalent to $\frac{1}{8}$) will be revisited later in the unit when working on dividing decimals.

Technology Integration

The use of iPod Touches and the Notebook software will enhance and engage student learning throughout the lesson. First, most students will be more engaged in playing a game on an iPod instead of doing a worksheet of drill and practice questions. The content is still the same as a worksheet but the competitive nature of the game and the fact that students do not have to write answers engage the student more. In addition, students are excited to use technology that is not used in other classes.

The Notebook software will enhance the lesson because students will have an opportunity to create a short presentation using tools like circle and rectangles to make a more precise drawing, if they wish. They may also use color and add animations if they want to be creative in their presentations. Also, using the Notebook software allows all students to work at the same time to create a presentation so students do not have to wait for a group to create their presentation when it is their turn to present. All groups can create at the same time, thus saving time. In addition, students can zoom in on their presentation so it is big enough for all students to see no matter where they sit in the classroom. This is a drawback to using chart paper for group presentations. If students don't write clear enough or big enough on the chart paper, it is difficult to follow a peer's thinking. The Notebook software allows the class to better follow peer thinking.

Because of the iPods and the Notebook software, the students are essentially leading their own learning. During the app section, students can decide what level to work on (easy, medium, or hard) so that they are challenged. They become in charge of how much they want to learn. The Notebook presentations will be the students teaching the students. During both activities, the teacher no longer is the leader but rather the facilitator. The teacher will help students who are struggling but allow students to ask questions of each other and support each other. The teacher will be asked to answer questions about the Notebook software and the functionality of the app but most content questions will be asked by the students to the students during the classroom discussion.

Connection to Standards

The standard we will be addressing is the Common Core State Standard of students will use proportional relationships to solve multistep ratio and percent problems. In order to solve the problems, students must understand the connections between the fractions, decimals, and percents for the same rational number.

Two technology standards will be addressed through this activity. First, students will use digital media and environments to communicate and work collaboratively through interactions with peers. The Notebook software will allow students to communicate to their classmates their thinking about the math content. Students will also work with their partners to create a presentation with the software. Second, students will demonstrate understanding of technology concepts and operations while using the technology. Students will learn and know how to operate the iPods while using the app. Also they will learn how to use the Notebook software and troubleshoot any issues that may arise while using the laptops.

Student Prior Knowledge

In order to assess student prior knowledge, I will start by having an exit card activity the day before asking students what is the decimal and fraction for 50%? I will look over the exit cards to get an idea of who has had experience with the concept and who has none or limited experience. Second, I will start the lesson off with a warm up. I will pass back the exit cards from the day before and ask students to prove why they think their answers are correct. Then I will ask students to turn to their table partner and explain their thinking.

Based on student answers to the exit card the day before, I will note which students seem to have limited prior knowledge of this concept. When students are working on the app, I will make sure these are the students I visit first. I will provide manipulatives, such as fraction circles with matching percent and

decimal plates, to these students. These manipulatives will provide students with an alternate strategy for playing the app and an alternate representation of the rational numbers.

Content Knowledge

To teach this lesson, a teacher must have a strong content knowledge in fractions, decimals, and percents. First, a teacher must understand that any rational number can be represented as a fraction, decimal, and a percent. A teacher must know how to represent a fraction in several different ways (i.e. a picture, a ratio, and as a part of a whole). A strong understanding of equivalent fractions is also necessary to teach this lesson. Knowing that a decimal can also be represented as a picture or a part of a whole is essential to this lesson. A teacher must understand how a fraction is related to decimal: as either an equivalent fraction with a multiple of ten as a denominator or as the numerator divided by the denominator. In addition, a teacher must understand the algorithm for long division using decimals in order for students to convert a fraction into a decimal using the numerator divided by denominator method. Place value is also an integral part of the content of the lesson. The correct way to say a decimal, using place value and not the word “point”, is essential to converting a decimal to fraction. Finally, a teacher must understand that a percent means out of a hundred and to convert a decimal to a percent you multiply by 100.

Pedagogical Knowledge

There are several instructional techniques used in this lesson including independent work, partner work, and classroom discussion. Independent work is important for my students because they must learn how to problem solve and answer problems on their own. In order for a student to master a math concept, he or she must be able to work independently to find a solution. The app section of the lesson allows for this independent practice of the concept.

Partner work and classroom discussions are appropriate strategies for my students because in 6th grade students want to communicate with each other. It is important that students know how to explain their thinking to peers and hear other peers thinking so that misconceptions can be uncovered and different methods of solving a problem can be shared or discussed. By explaining their thinking and questioning other students methods, all students are gaining a deeper understanding of the concept.

All of these pedagogical strategies are important to this activity because each one allows students to delve deeper into the concept and provides a foundation for the unit. Each layer of the activity asks students to think more critically about their methods and work to find an algorithm that always works for converting between the fraction, number and percent. Also, multiple representations of the same concept allows for a richer understanding of the mathematics.

Technology Knowledge

To teach this lesson, a teacher must be comfortable with using an iPod Touch. A teacher must know how to turn the iPod on and how to access an app. A teacher must also know how to purchase and install an app. A teacher must also know how to troubleshoot problems that might arise with the iPod Touch, such as how to turn off the iPod if it becomes frozen, how to find an app using the search feature, how to restore an app that might get accidentally deleted, how to update the software on an iPod. It is also beneficial to know how to use the restrictions settings on the iPod so that features like FaceTime, YouTube, and Safari can be shut off when doing this lesson.

Being comfortable using the SMART Notebook software is also important to have a successful lesson. A teacher must know many features of the software including how to access the software, how to create a new document, how to save, how to draw, write, use shapes, shade, type and make the lesson interactive. A teacher must also know how to save the files in a central location (the cloud, shared drive) so that they can be projected on the SmartBoard.

TPACK Analysis

I choose to teach this concept using iPod Touches because I have classroom set of them. The students are familiar with the iPod Touch because about half of them have their own at home. Each student is able to work independently because I have the resources available to make this pedagogical decision. Also, they are a mobile technology so we can still be in our classroom instead of having to be in a computer lab. In addition, we do not have to spend time waiting for students to sign on to a computer and find a program or website. Students can be working on the math in matter of seconds instead of a matter of minutes.

I choose to have the students look for patterns and connections while working on the iPod so that students have a purpose to using the app. Many times I have witnessed students “playing” with the apps. They are just touching buttons instead of making purposeful decisions about what to click on. By giving students a purpose of looking for patterns and connections while working through correct and incorrect answers, students are more focused on the math and less focused on the technology.

I chose to have students work in partners using the Notebook software because of two reasons. The first reason is the software is installed on all of our laptops and we have a license to use it because we have SmartBoards installed in our schools. I think it is important for students to understand how to manipulate the software that we use everyday in class while using the Smartboard. Second, I chose partner work because creating an algorithm can be difficult for the concrete thinkers. Partner work allows students to bounce ideas off of each other and support each other as questions arise.

A classroom discussion using the Smartboard is a normal part of our classroom routine. Everyday we gather on the carpet in front of the board to summarize our thinking from our math lesson that day. I choose to have the students on the carpet because we can all hear each other better when we are closer and every student has a good view of the Smartboard. I chose to let the students lead the discussion because

this is their learning. I have found in the past that students learn much more from each other than from me. Some students tend to tune me out and will listen better when a peer is speaking. Other students need to work on listening more to their peers and this provides an opportunity for that. I chose to use the Smartboard because students can upload work they have already created instead of having to recreate it. Also, we can enlarge work so that all students can see it. Last, my students love to use the Smartboard. Most classrooms do not have one installed so this is a rare experience for most of the students. They enjoy interacting with board and trying new things.

Assessment Plan

I will assess the lesson through many formative and one summative assessment. As students are working on the app, I will circulate and look at the progress they are making. The app also has a feature that tracks their progress so after the lesson is complete, I can monitor student progress if one chooses to use the app another day. While students are working with partners, I will rotate through groups listening to student understanding and assessing where they are in their learning. Another formative assessment I will use is homework. I will ask students to practice the concept that night through a homework assignment of practice problems. Students who have trouble with the homework will be asked to keep working on the app during our math app time in class. Also, I have conferring time with students each day and I can continue to work with those struggling students during that time. Lastly, I will have a summative assessment in the form of a unit test that will assess students' understanding of converting between the three forms of a rational number. If students can answer 85% of the questions about this concept, then I will know the learning objective was met. Also, if students can answer story problems involving converting between these concepts, then I will know the objective was met.